FAULT
'SPOTLIGHT'
BY
TYPE
INSPECTION OF FLEXIFORM WINGS

Note that this 'in the field' check is not considered by the manufacturer to be an adequate substitute for a full factory strip-down and replacement programme.

1. Ensure that the battens match the patterns on the profile sheet.
2. Rig the glider to where the battens have been inserted, checking that the tip batten hooks are in good condition.
3. Examine the bowsprit, slider and pin and put them in place.
4. Examine the top rigging wires, both side-to-side and front-to-back.
5. Check the tail tube and its attachment to the sail.
6. Check the whole of the upper surface of the sail for any wear or damage.
7. Put the control frame in place and check the pin before insertion.
8. On the Starboard side:
   *8.1 Check the outer bowsprit wire and its attachment to the leading edge.
   8.2 Do the same for the inner bowsprit wire.
   8.3 Check the self-tapping screw and the sail attachment to the leading edge.
   8.4 Check along the leading edge, through the cloth, out to the tip.
   8.5 Check the tip attachment and, where fitted, the tip-batten elastic.
   8.6 Check the Velcros under the trailing edge and all the sail undersurface.
9. Repeat from * to check the whole of the Port side of the wing.
10. Check the tail bracket, the keel and the lower, rear, wire attachment.
11. Check the king-post attachment, the hang plates and the trike block.
12. Check the control frame plates and bolts and Starboard upright.
13. Check the side, front and rear attachments, the knuckle and bottom bar.
14. Check the Port knuckle; side, front and rear attachments and the upright.
15. Finally, check all the lower wires; Starboard front, side and rear, then Port rear, side and front.
16. The trike should be checked in accordance with the appropriate trike schedule.
CHECK LIST

Battens
Batten hooks
Bowsprit
Slider
Pin
Side-to-side wire
Front-to-back wire
Tail tube
Tail tube attachment
Upper sail-surface
Bowsprit nuts
Outer Stb. bowsprit wire
Inner Stb. bowsprit wire
Self-tapping screw
Sail attachment
Leading edge
Tip attachment
Tip-batten elastic
Sail velcros
Outer Port bowsprit wire
Inner Port bowsprit wire
Self-tapping screw
Sail attachment
Leading edge
Tip attachment
Tip-batten elastic
Sail velcros
Sail undersurface
Tail bracket
Keel
Rear wire-attachment
King-post attachment
Hang plates
Hang-plate bolts
Trike block
Control-frame plates
Control-frame bolts
Starboard upright
  " front/rear-wire attachment
  " side-wires attachment
  " knuckle
Bottom bar
Port knuckle
  " side-wires attachment
  " front/rear-wire attachment
  " upright
Starboard front wire
  " inner side-wire
  " outer side-wire
  " rear wire
Port rear wire
  " outer side-wire
  " inner side-wire
  " front wire
FAULT 'SPOTLIGHT' BY AIRCRAFT TYPE

These notes are intended to highlight specific points on various microlights which are known, from experience, to warrant close attention.

THE NOTES ARE NOT TO BE TAKEN AS COMPLETE AND INFALLIBLE; IT MUST NOT BE ASSUMED THAT THE FAULTS MENTIONED ARE THE ONLY ONES LIKELY TO OCCUR ON THAT TYPE OR THAT THEY ARE NECESSARILY UNIQUE TO IT.

With the help of inspectors, it is hoped that these notes may become an increasingly useful adjunct to the INSPECTION GUIDE-LINES. Direct feedback from inspectors will be invaluable in achieving this.

REPORTING OF DEFECTS.

As information for all inspectors, on the reporting of Defects to the Chief Inspector, the basic headings of the form are listed below:

DEFECT WARNING No: (Ch. Insp provides).

AIRCRAFT TYPE:

REGISTRATION LETTERS OF AIRCRAFT:

DESCRIPTION OF DEFECT:

AIRWORTHINESS IMPLICATIONS:

HOURS FLOMN, FLIGHTS MADE, RELEVANT TO THE DEFECT:

PROBABLE CAUSE OF FAILURE/DEFECT:

RECOMMENDED RECTIFICATION (REPAIR, REPLACEMENT, MODIFICATION):

REPORTED TO THE MANUFACTURER OR AGENT:

NAME AND ADDRESS OF PERSON REPORTING DEFECT:

OTHER RELEVANT COMMENTS:

DATE: (Of issue by Ch. Insp.)

Note: Inspectors should NOT feel obliged to fill in every section.

For example, to complete the section on recommended rectification may sometimes take the inspector into dangerous legal ground, if the manufacturer is still trading.

Inspectors should fill in the form to the best of their ability, then send it to me. I may not issue a Defect Directive in every instance, if it is inappropriate.

Peter Lovegrove
Chief Inspector to the BMAA.

25 June 1985
IMPORTANT NOTICE TO ALL BMAA INSPECTORS.

INSTANT ACTION REQUIRED.

The BMAA has received information that flex-wings are being submitted for their check-flight on the basis of documentation signed by BMAA inspectors, to the effect that the aircraft has been properly inspected and that it is fully acceptable for such a flight. YET SOME OF THESE MACHINES HAVE RECEIVED NO INSPECTION OF THE WING AND, IN THE WORST INSTANCES, THE WING HAS NOT EVEN BEEN REMOVED FROM ITS SAIL-BAG!

All BMAA inspectors must note that they MUST complete a full and thorough inspection of ALL parts of any BMAA aircraft. If they consider that their skills are more appropriate to the inspection of fixed-wing (3-axis) machines, they MUST inform the owner to that effect and instruct him to seek out a flex-wing oriented inspector.

ANY BMAA INSPECTOR FOUND TO HAVE DELIBERATELY FAILED TO HAVE CARRIED OUT A COMPLETE AND THOROUGH INSPECTION IN ENTIRETY OF ANY MACHINE SUBMITTED TO HIM AND, WORSE, AUTOMATICALLY APPROVED THAT AIRCRAFT FOR A CHECK-FLIGHT, HIS NAME WILL IMMEDIATELY BE REMOVED FROM THE LIST OF APPROVED BMAA INSPECTORS.

INSPECTORS WHO HAVE ACTED WITH SUCH IRRESPONSIBILITY SHOULD REFLECT UPON THE DANGER IN WHICH THEY THEN PLACE THE UNSUSPECTING CHECK-PILOT.

The legal protection of BMAA inspectors hinges upon the statement that they are signing the aircraft out as "satisfactory at the time of being inspected", to paraphrase the form. If a machine crashes during its subsequent check-flight and kills or injures the pilot, the inspector will have little legal protection if he did not actually carry out a COMPLETE inspection, yet signed as though he had.

PETER LOVEGROVE
Chief Inspector.

10 MAY 1985

24th May 1985

TO: ALL AREA AND LOCAL INSPECTORS

The question has been asked: Are BMAA inspectors allowed to examine and clear aircraft which they personally own, or in which they have some direct financial or business involvement?

The general answer to this question is an emphatic "NO". BMAA inspectors are only authorised to examine microlight aircraft of the category which they are cleared to survey (that is, fixed-wing or flex-wing) and belonging to persons other than themselves.

In very special circumstances, such as there being no suitable inspector available within, say, 40 miles, an inspector may seek (from the Chief Inspector), authority to conduct the survey of his own aircraft. But it must be pointed out that such authorisation will not be freely or automatically granted. Even if it were, it would not be a "blanket" authority, but would be relevant only to nominated machines with specified registration letters.

Inspectors operating under the auspices of a CAA-approved Company are, of course, subject to the conditions of the relevant Approval and are not necessarily controlled in the same way as our BMAA field inspectors.

Peter Lovegrove
Chief Inspector to the BMAA
Many of you will be aware that the Robin 440 Lightweight twin has shown itself very prone to breaking its crankshaft.

The latest failure of such a shaft - in mid-flight - resulted in the pilot receiving facial injuries and a dislocated shoulder and, of course, a spell in hospital. He was unable to reach a suitable emergency-landing site and landed short in his attempt to stretch the glide.

In view of the large number of shafts which have failed in these engines (it is only the LIGHTWEIGHT 440 to which I am referring), the BMAA is forced now to regard them as all very likely to fail in a relatively small number of operating hours.

When inspecting any machine having a Robin 440 twin, determine if it is a LIGHTWEIGHT 440 and, if so, require a full strip-down of the engine, followed by a rigorous examination of the crankshaft by Magnaflux, Dye penetrant or similar. Only when it has been fully established that no evidence of fatigue failure is detectable, may the engine be reinstalled, the installation inspected and the aircraft cleared for check-flight or use by the owner, as appropriate.

Peter Lovegrove
Chief Inspector to the BMAA
3 June 1985
BMIAA has just received the following letter from Aerotech International Ltd: Inspectors may wish to inform owners who might not have heard directly about the situation regarding replacement crankshafts for these lightweight engines.

**AEROTECH INTERNATIONAL LTD**

**MICROLIGHT AIRCRAFT**

SALES | TRAINING | SERVICE

Unit 2 Buckingham Road Ind. Est. Brackley Northants Tel: (0283) 700369

Easylink No. 19016005

Dear Customer,

Fujif Robin EC44-2PM Replacement Crankshaft Kits.

We wish to advise you that replacement kits as above are now available at special low prices:

<table>
<thead>
<tr>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 x 150-20104-00</td>
<td>£101-14.</td>
</tr>
<tr>
<td>Crank Assembly.</td>
<td></td>
</tr>
<tr>
<td>1 x 150-70122-08</td>
<td>£73-65.</td>
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<tr>
<td>Flywheel Assembly.</td>
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<tr>
<td>1 x 005-30041-01</td>
<td>£93.</td>
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<tr>
<td>Key.</td>
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<tr>
<td>1 x 020-31800-10</td>
<td>£18.</td>
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<tr>
<td>Spring Washer.</td>
<td></td>
</tr>
<tr>
<td>1 x 017-01800-11</td>
<td>£2-96.</td>
</tr>
<tr>
<td>Nut.</td>
<td></td>
</tr>
<tr>
<td>4 x 153-25001-03</td>
<td>£1-04.</td>
</tr>
<tr>
<td>Piston Pin Circlips.</td>
<td></td>
</tr>
<tr>
<td>2 x 150-15001-03</td>
<td>£50.</td>
</tr>
<tr>
<td>Base Gaskets.</td>
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</tr>
<tr>
<td>2 x 115-15101-11</td>
<td>£4-72.</td>
</tr>
<tr>
<td>Head Gaskets.</td>
<td></td>
</tr>
<tr>
<td>4 x 110-35201-01</td>
<td>£4-08.</td>
</tr>
<tr>
<td>Exhaust Gaskets.</td>
<td></td>
</tr>
<tr>
<td>2 x 150-65801-13</td>
<td>£2-24.</td>
</tr>
<tr>
<td>Intake Gaskets.</td>
<td></td>
</tr>
<tr>
<td><strong>Parts Only.</strong></td>
<td><strong>£189-47.</strong></td>
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</table>

To fully rebuild EC44-2PM1000 engine with new strengthened crank assembly and modified flywheel, including above listed parts, materials and labour charges (Running engines):

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<thead>
<tr>
<th>Description</th>
<th>Price</th>
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</thead>
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<td>1 x 150-20104-00</td>
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<td>£25-96.</td>
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<tr>
<td>1 x 005-30041-01</td>
<td></td>
</tr>
<tr>
<td>Key.</td>
<td></td>
</tr>
<tr>
<td>1 x 020-31800-10</td>
<td></td>
</tr>
<tr>
<td>Spring Washer.</td>
<td></td>
</tr>
<tr>
<td>1 x 017-01800-11</td>
<td></td>
</tr>
<tr>
<td>Nut.</td>
<td></td>
</tr>
<tr>
<td>4 x 153-25001-03</td>
<td></td>
</tr>
<tr>
<td>Piston Pin Circlips.</td>
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</tr>
<tr>
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<td></td>
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<td>Base Gaskets.</td>
<td></td>
</tr>
<tr>
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</tr>
<tr>
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<td></td>
</tr>
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</tr>
<tr>
<td>Exhaust Gaskets.</td>
<td></td>
</tr>
<tr>
<td>2 x 150-65801-13</td>
<td></td>
</tr>
<tr>
<td>Intake Gaskets.</td>
<td></td>
</tr>
<tr>
<td><strong>Total.</strong></td>
<td><strong>£199-00.</strong></td>
</tr>
</tbody>
</table>

All damaged engines must go through normal warranty claims procedures.

Cheque Dec 1985
INSPECTOR'S MANUAL

Procedures for Handling Permits to Fly/Individual Exemption Documents for Issue/Renewal

General Comments

1. The procedure has been designed to minimise form filling on the part of the owners of aircraft.

2. Forms required by the GAA will be dealt with by the BMAA Office and need not concern the owner.

3. The Area Inspector signature requirement on Applications/Renewals has been dropped.

4. On completion of the Type Acceptance Target programme, Forms AW/004 and 005 will disappear.

5. Copies of all forms relevant to Inspectors are available from the BMAA Office.

Introduction

1. Aeroplanes to be inspected/test flown can come under one of three headings

(a) New Aeroplanes - A term used for any aeroplane which first flew after the 1st January 1984. Such aeroplanes can only fly under a 'Permit to Fly' and must be inspected against a 'Type Approval Data Sheet' on an annual basis.

(b) Old Aeroplanes (1) - Those which were flying prior to the 1st January 1984 which are awaiting 'Type Acceptance'. Such aeroplanes fly under a 'Target Exemption' bearing a target expiry date and require 6 monthly and 12 monthly Clearance Certificates - the latter filling the gap until changing to an Annual Exemption on attaining Type Acceptance.

(c) Old Aeroplanes (2) - Those which were flying prior to the 1st January 1984 which have joined 'Type Exemption/Permit to Fly' bearing an Annual Expiry date and must be inspected against a 'Type Acceptance Data Sheet' on a 6 monthly basis.

2. Aeroplanes purchased from approved manufacturers will come complete with a Permit to Fly. Inspectors/Test Pilots will, therefore, only be concerned with Renewals where Permits to Fly are involved.

3. Forms pertaining to the procedures are as follows

<table>
<thead>
<tr>
<th>ACTION</th>
<th>FORM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner</td>
<td>BMAA/AW/001</td>
<td>Application for Issue of Individual Exemption</td>
</tr>
<tr>
<td>Owner</td>
<td>- Application for Renewal of</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Permit to Fly/Individual Exemption</td>
<td></td>
</tr>
<tr>
<td>Office</td>
<td>BMAA/AW/002</td>
<td>Application for 6-monthly Flight Clearance</td>
</tr>
<tr>
<td></td>
<td>Certificate</td>
<td></td>
</tr>
<tr>
<td>Office</td>
<td>BMAA/AW/003</td>
<td>6-monthly Flight Clearance Certificate</td>
</tr>
<tr>
<td>Office</td>
<td>BMAA/AW/004</td>
<td>Annual Flight Clearance Certificate</td>
</tr>
<tr>
<td>Owner</td>
<td>BMAA/AW/005</td>
<td>Application for Exchange of Target Individual</td>
</tr>
<tr>
<td></td>
<td>- Application for Renewal of</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exemption for Annual Individual</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Exemption for Exchange of</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Old Aeroplanes</td>
<td></td>
</tr>
<tr>
<td>Inspector</td>
<td>BMAA/AW/006</td>
<td>Inspection Schedule for Flex Wing Aeroplanes</td>
</tr>
<tr>
<td>Inspector</td>
<td>BMAA/AW/007</td>
<td>Inspection Schedule for Fixed Wing Aeroplanes</td>
</tr>
<tr>
<td>Test Pilot</td>
<td>BMAA/AW/011</td>
<td>Flight Test Schedule 'Series' Production</td>
</tr>
<tr>
<td></td>
<td>Aeroplanes</td>
<td></td>
</tr>
<tr>
<td>Check Pilot</td>
<td>BMAA/AW/012</td>
<td>Check Flight Schedule for Old Aeroplanes</td>
</tr>
<tr>
<td></td>
<td>- Waiting Type Acceptance</td>
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</tr>
<tr>
<td>Inspector</td>
<td>BMAA/AW/015/...</td>
<td>Type Approval Data Sheet for .......... aeroplanes</td>
</tr>
<tr>
<td>Inspector</td>
<td>BMAA/AW/016/...</td>
<td>Type Acceptance Data Sheet for ..........</td>
</tr>
<tr>
<td></td>
<td>- for Old Aeroplanes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. An aeroplane must be registered with the GAA in the name shown on the application form before such an application can be processed.

5. On renewal of any document owners should be reminded to arrange for Inspection/Test Flight in good time to allow for the issue of the new document prior to expiry of the old one.
WILL ALL AREA AND LOCAL INSPECTORS AND CLUB SAFETY OFFICERS PLEASE NOTE THE CONTENTS OF THIS DIRECTIVE
AND DISSEMINATE ITS CONTENTS AS WIDELY AS POSSIBLE?

**Civil Aviation Authority**

**MANDATORY AIRCRAFT MODIFICATIONS AND INSPECTIONS SUMMARY**

<table>
<thead>
<tr>
<th>CAA AD No.</th>
<th>Associated Material</th>
<th>Description</th>
<th>Applicability - Compliance - Requirement</th>
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</thead>
<tbody>
<tr>
<td>003-10-85</td>
<td>Mainair Sports AB No. 17</td>
<td>Inspection of the main vertical strut (pylon) for cracks or deformation.</td>
<td>Applicable to Mainair Sports microlight aircraft as detailed in Airworthiness Bulletin. Compliance required as detailed in Airworthiness Bulletin.</td>
</tr>
</tbody>
</table>

Issue 1
October 1985

Peter Lovegrove
Chief Inspector to the BMA
Fuel tank sight gauge

Exposure to fuel has the effect of shrinking the P.V.C. tube used as the sight gauge, and pulling it from the tank stubs. Check that the tubes are not under tension and suggest to the owner that he replaces the tube at six-monthly intervals.

Engine mountings

Ignition switch

Low-voltage motorcycle component used; should be replaced with mains-rated switch.

Titan

Fuel tank sight gauge

As for T250

Steering arms

Heavy landings bend and break the dual steering assembly, due to the momentum of the pilot's and passenger's feet. Check assembly for cracks. The steering is also prone to become stiff to operate.

Cross-boom centre-plate support

The cross-booms are prevented from dropping on to the keel by a wire which runs from the king-post, through a shackle on the cross-boom's centre-plate, and up to the nose. The shackle pin passes through a hole in the bolt which, in some cases, has been drilled too near the end of the bolt and thereby is prone to break open on hard landings.

Ignition switch

As for T250

Propeller boss

On some machines, the propeller boss had flanges which were only 5 mm thick, instead of 15 mm. These bosses MUST be replaced with new ones, having the correct dimensions; nothing can be done to rectify the dud bosses.
DUET

Engine fan-belt tension

Inadequate tension lets belt slip at high RPM. Fan does not cool cylinders and pistons may melt.

Clevis pins

Types installed may have holes drilled too close to ends.
(Defect Report No. 003)

FLEXIFORM SKYSAILS

Outer battens

The wing-tip battens locate on steel pegs pop-riveted to the leading edge. Check the pegs for looseness. If necessary, replace the aluminium rivets with steel ones.

Batten-retainign Velcro

Outboard Velcro often scrape on the ground during careless handling. Check for wear. Replace or line the Velcro with another material at the point of contact.

Centre tail-boom leach-line

Check that this leach-line is in good condition and firmly attached to its anchorages.
(Defect Report No. 012).

Solo Strikers and Solo Seelander

MANDATORY modifications required by CAA. Wings cannot be flown unless these have been carried out and signed off.
(Defect Reports No. 004 and 006 (Amendment 3) apply).

Dual Strikers and Dual Seelander

OBLIGATORY modifications are required by the BMFA. Inspectors should not sign off wings which have not been modified.
(Defect Report No. 024 applies).
FUJI ROBIN TWINS AND SINGLES

Ignition wiring

(a) H.T. wiring may be over-crimped near the ignition coil.
   (Defect Report No. 015)

(b) Ignition wiring may work-harden and fail.
   (Defect Report No. 026)

Filters

Fuel-filters with paper elements may shed fragments into the fuel lines.
(Defect Report No. 018)

Spark-plugs

Use of incorrect type may cause over-heating.
(Defect Report No. 026)

GOLDWING

Reduction drive

Bearing spacer on Huntair power unit.

Jammed spoilers

Slot ahead of spoiler to be widened.

Spoiler/aileron cables

Corrosion of these cables.
(Defect Report No. 022).

Stub axles

Owners may 'improve' undercarriage (sometimes with disastrous results; see Defect Report No. 023).
HIWAY CONTINUED....

Rigging-wire terminations

Ensure that the control-frame eye-bolts for the lower rigging are not so tight that they prevent movement of the thimbles.

Cross-boom centre junction

One pair of the cross-boom centre-plates is attached in such a way as to apply a bending moment to the pair of bolts on their threaded portions. These bolts are only commercial M8s. Suggest that the owner replaces them with quarter-inch diameter aircraft quality bolts and, if possible, to over-sleeve and pop-rivet the offending end for 6 inches (150 mm), to remove the need for the stack of washers.

Propeller clearance

Some models and trike/wing combinations have inadequate propeller clearance. Pay particular attention to this problem if a Skymaster parachute is attached to the keel; its momentum, on heavy landings, increases the sag in the rear lower cables.

Hang channel

Check carefully for any bending in the holes which attach the hang channel to the keel. Also check for excessive wear and slackness in the small channel at the top of the control frame.

Hang-bracket

A brass bush is used to sleeve the hinge bolt and this corrodes very badly in close proximity to aluminium. Check that the corrosion has not reached dangerous proportions.

Cross-tubes between the two vertical frame-tubes

These are prone to crack if excessive vibration has occurred. (Check engine-mounting suspension units.) (Defect Report No. 017).

HOLE ENLARGEMENT IN HIWAY FLEX-WING HANG-BRACKETS.

Inspectors have commented on the enlargement of the bolt-holes in the channels which form the hang-brackets on Hiway flex-wings.

These brackets all exhibit quite considerable wear and the question arises as to should the inspector ask for the channel to be scrapped, the holes drilled out for larger bolts, or what? At what stage must the inspector dig his heels in and insist on some remedial action being taken?

First of all, it should be noted that, during the original manufacture, these channels seem to have been drilled 1/4-inch diameter and then 6 mm diameter bolts fitted. In common with the rest of the airframe, in some specimens seen, they do not appear to have been drilled very expertly either, so were not round holes. The resultant rattling good fit on the bolts gives a perfect example of the "wear begets wear" syndrome, and the holes soon enlarge further. Even when new, some of them had enough play to seem worn.

Provided that the holes in the keel are not badly enlarged and the problem is only with the channel to any serious extent, I think the following may be taken as a reasonable guide. The enlarged holes (originally 1/4" diameter) can be considered acceptable until they have become of sufficient diameter to receive a 9/32" diameter probe, say, a piece of silver steel. Once that probe will pass freely into them, they and their counterparts in the wing keel, should be drilled and reamed out to receive either 5/16" or 8 mm diameter bolts (there is only a fraction between these two sizes anyway).

The only limitation on this suggestion is that it assumes that the material of the channel is not less than 1/8" or 3 mm thick and that - even when the holes are raised to 5/16" diameter - there is not less than 1/4" (6.5 mm nominally) between the edge of the channel and the nearest point of the hole (see sketch below). These two conditions should take adequate account of variations in the strength of the material actually used.

Swimming up, then, once the holes have passed the halfway mark between their original size and the next standard size, they should be cut to that new size. Because of the increased bearing area, the wear-rate will then decrease.

Peter Lovegrove
Chief Inspector to the BMAR.
17 September 1985.
1. A Weight and Balance check must, with every Whing-Ding, be carried out to determine the loaded Centre of Gravity position (i.e. with the pilot in the seat). It is critical and almost always comes out too far aft if the aircraft has the optional built-up tail assembly.

   The limits are 15% to 30% S.M.C.

   Note also that, with the wing-loading constraint which applies for the Hovey Whing-Ding to qualify as a 'microlight', its maximum empty weight is 100kg.

2. Because it is a home-built, the following items are Class 1 as far as materials are concerned:

   (a) Main and rear spars to be made from knot-free Grade 'A' spruce.

   (b) Wing ribs to be made from HE3CTF tube or similar. Annealed hydraulic quality seamless tubing (L.56) is too soft and will fail in flight.

   (c) The boom: the to be made from 6061-T6 or L.114, with the recommendation that the diameter be increased from 3 inches to 3 1/4 inches, if the aircraft weighs over 70kg.

   (d) Only Aerolite, Aerodux or epoxy-resin glues are to be used. The use of white PVA, of any quality, is expressly and totally forbidden.

3. The diameter of all cables must be increased over the sizes shown on the plans. Appropriate sizes are as follows:

   (a) Flying and landing wires: 3 mm diameter.

   (b) Wing-warp wires 2.5 mm diameter, and extra flexible.

   (c) Rudder and elevator cables: 2 mm diameter.

4. It is strongly recommended that the wing inter-plane strut-end fittings, which are free-floating to cater for the wing-warping, be replaced by rod-end bearings. (Contact the Hovey Whing-Ding 'Godfather', Robin Horton, 28 Aldworth, Cheltenham, Glos, GL54 3QZ. Telephone: 04514-371, for drawings).

5. A top wing front-spar reinforcement was shown to be necessary during stress analysis carried out for Type Approval. Contact the 'Godfather' for drawings.

6. A 4-point shoulder-harness must be fitted, instead of the lap-strap shown on the plans.
7. A fourth wing-spacer must be installed at Wing Station 94.

8. Commercial-head hexagon-head screws are fitted as standard, between the reduction-pulley and the propeller-hub, on the Skycraft Pixie 175 engine.

9. It is strongly recommended that all owners, builders and interested inspectors should contact the "Godfather", as a set of improved Building Notes, a Materials List and extra drawings are now available.

HUMMER

Engine-bracing cables to wing-bolts
Tangs on these cables may fail.
(Defect Report No. 007).

Exhaust-retention springs
Failure may release spring and exhaust.
(Defect Report No. 027).
PATHFINDER Mk. 1

Lower engine-mount attachment

The attachment is secured to the keel by a bolt, with a wing-nut and a spring-ring. The nut and ring must be replaced with a self-locking nut. Care must be taken to ensure that the bolt's hole or burrs do not damage the locking device (Nylon) or thread (Simonds-type nuts).

Engine-mount side-tubes

The tubes which support the engine at its sides are very prone to enlarge their holes where they attach to the cross-bar at their front end. Check carefully for excessive wear.

Propeller hub

Replace the wing-nuts and spring-rings with self-locking nuts.

Propeller-hub attachment screws

Socket-head screws with a minute filed flat were used to mount the propeller hub to the reduction gear. These screws have to be replaced with hexagon-head screws which properly lock into place.

Reduction drive

Check the bearing spacer on the propeller shaft.

Exhaust mounts

Check for cracks, especially round welds.

Control stick

The stick pivots on an M6 bolt which passes through a bush with an inside diameter of 0.250 inches (6.35 mm). This leads to slackness and unnecessary wear. Recommend that the bolt be replaced with a quarter-inch diameter aircraft-quality bolt.

MAINAIR SPORTS

TRIFLYER SOLO

Wire bracing

Check carefully for thimble elongation at the front end of the axle-drag wires. Also check for hole elongation on the axle tie-wire bolt-holes. Elongation here leads to flattening of the axles, with a consequent rapid increase in the wire tension and runaway failure. Ensure that the wires which brace the pylon are under tension.

Exhaust mounts

Check the rubber isolation-mounts. Also, Nyloc nuts are often used (the Nylon will flow when it gets hot) and should be replaced with Simonds-type nuts.

Fuel tank

Early models allowed the propeller shaft to rub on the fuel tank, under some conditions.

TRIFLYER DUAL

Lower engine mount

The quarter-inch diameter bolt, securing the Lord mount to the pylon, bends on hard landings. It must be replaced with a 5/16 diameter bolt.

Wire bracing

As for solo Triflyer. Note that clumsy folding of the trike (before removing side-strut pips-pins) can result in excessive tension being applied to the axle drag-wires.

GEMINI

Reduction drive

The propeller bearing housing is secured by four socket-head countersunk screws. Check their tightness, in spite of the centre-punch locking marks being aligned.
SPECIAL POINTS TO NOTE DURING INSPECTION OF
ULTRAFLIGHT MIRAGE MARK 2
(Compiled by L.J. Perrins, January 1985)

CARRY OUT ALL NORMAL INSPECTION PROCEDURES AND ADD THE FOLLOWING SPECIAL
CHECKS, PERTINENT TO THE MIRAGE MARK 2

1. Keel assembly. Refer to drawings and the recommendation (issued 13
   January 1984), given below:

   "NO FURTHER FLYING OF MIRAGE AIRCRAFT SHOULD TAKE PLACE UNTIL
   THE KEEL ASSEMBLY HAS BEEN THOROUGHLY INSPECTED, TO ENSURE THE
   ABSENCE OF ANY CRACKS. THIS INSPECTION MUST BE REPEATED EVERY
   10 FLYING HOURS, OR EVERY 5 HOURS OF ENGINE RUNNING TIME ON THE
   GROUND, WHICHEVER IS THE LEAST"

   Check the keel for cracks, especially directly behind the engine plate.
   Small cracks in the welds which attach the bearing-mounting tabs may be
   tolerable, provided that they are carefully monitored and not allowed to
   grow unobserved.
   Cracks are more prevalent on Cuyana-powered machines.

2. Check the control-stick mounting bracket, particularly if it is made from
   other than 'gold' or 'black' anodised alloy.
   (a) Stainless steel needs to be gussetted, as original welds were not
       strong enough.
   (b) Where plate (natural finish) aluminium alloy has been used, it must
       be replaced.

3. Check the diagonal cage uprights for cracks at the top, near the lower
   bolt hole. (See drawing). If the angle of the tube does not match the
   flat mounting face, shim the upright to bring them into alignment and so
   relieve the stress caused by mis-matched angles.

4. Check the upper wires at the king-post attachment, (the tang on each side,
   fastened with one AN4 bolt and nut). The tang centre hole on either side
   can become elongated and the tang bent if subjected to constant heavy 'g'
   loads, (such as snow!). As a result a 'pull-through' condition might
   arise. The tangs then need replacement.

5. The outer sheath of the rudder cable can become rusted, which causes loss
   of rudder travel or total jamming.

6. The spar end caps must be rivetted using three STEEL rivets on each. The
   caps must be rivetted to prevent 'tuck' effects under loads.

7. Tail boom bolts. These bolts have usually taken on a shallow set (bend)
   due to the angle of the boom tubes. This is acceptable but, ON NO
   ACCOUNT, SHOULD THESE BOLTS EVER BE STRAIGHTENED. If they are removed,
   they MUST be refitted in exactly the original location, or new bolts used.

8. Spoilerons. The additional return spring may be fitted incorrectly. (See
   drawing for correct installation).

   (I have a modification on my Mirage to prevent over-centering of
   the spoilers without additional springs. For this, I am awaiting approval by
   the manufacturers.)

9. Some Mirages may have had very loose sweep wires inside the wing from
   original assembly. Check cables; are they correct length?

Please refer to drawing on points 1, 3, 7 and 8. If any inspector has any
further queries, please telephone me on 024-026-3492; I will be only too happy
to help if I can.

L.J. PERRIN.

MIRAGE WING/KEEL ASSEMBLY
G-HBSZ (242)

General layout

The wing/keel member provides the engine mounting and support for the
propeller shaft and propeller, at the same time as being the main chord-wise
member on to which the wing spars, king post and bar are attached. A typical
cross-section for the keel member is shown below:

The engine is mounted on to a 5 mm (approximately) thick plate, as shown at
the top of page 3:—
MAINTENANCE CONTINUED....

GEMINI CONTINUED....

Black engine-casing
May fracture and pieces may become detached.
(Defect Report No. 014).

Crankshaft
May fail near webs.
(Defect Report No. 021).

Propeller shaft
May fail just behind propeller boss.
(Defect Report No. 021).

Maita-Robin 440 Reduction
Failure of the studs which hold the reduction gear to the engine.
(Defect Report No. 010).

Suntour throttle levers
Loss of cover-fixing screw.

MIRAGE MARK 2

Propeller shaft
This shaft is a steel tube with an aluminium insert. It should be replaced with a solid steel rod, lightened if possible.

Control stick
Check the welds at the base of the control stick. Recommend to the owner that the assembly should be reinforced round the welds.
A typical propeller-shaft mounting is sketched below:

ENGINE

CRACK!

PROPeller SHAFT

BEARINGS
MBA TIGER CUB - 440 Robin Twin

Propeller shaft

On several of these engines, the propeller shaft (which also carries the large pulley), has failed in fatigue, just in front of the bearing nearest to the propeller. The failure has occurred after only 12 and 10 hours of use. Check for signs of fatigue, with a torch and magnifying glass. The shaft was originally of mild steel. It should be replaced with the newer shaft of stronger steel, if it cannot be definitely identified as already being of the correct new material.

Check also for bearing-to-shaft fit.
(Defect Report No. 001).

Pulley flange

Steel flanges may break free.
(Defect Report No. 020).
Engine mountings

This engine is mounted ONLY by its fan casing. Check very thoroughly for cracks.

Fuel pump

Advise the owner to mount the fuel pump clear of the crankcase. Fuel starvation has been known and is now believed to be due to engine vibration. Engine heat may also possibly contribute.

Bing carburettor

Check that the carburettor slide guide is a ridge raised in the barrel and not two steel pins, as fitted to some models. If the pins are fitted, refer to the Rotax Importers, as the pins break off and get ingested by the engine.

Cayuna engines

If the adjustment cam for belt-tensioning works loose, it allows the propeller to rub against the drive pulley. (Defect Report No. 019.)

QUICKSILVER MX 2

Control stick

Teleflex cable: check for signs of bending at the Teleflex inner, where it connects to the control-stick base.

The following features of High-performance Quicksilver aircraft need careful attention where they occur on a given machine, and Inspectors are asked to check the relevant areas with care, advising the owners of the suggested action.

1. Cork fuel-cap seals: Some of the cork fuel-cap inserts tend to flake and contaminate the fuel. In theory, the cork should float, but it has been known to get into the fuel lines and block them. Check any cork fuel-cap seals and replace them if they show any sign of flaking.

2. Course thread bolts: The manufacturers stated that all of the coarse-thread bolts on these aircraft must have Locite 290 or 242 applied to them when they are installed and again if they are removed. This is, of course, not acceptable to EMA. Bolts must have either a castellated nut secured with a pin or a spring-clip, or a Simmonds or a Nylok self-locking nut, as appropriate to the given application.

3. Teleflex cables: The ends of Teleflex cables must not be straightened. The cables can sometimes get bent at the stick-attachment point, when the pilot's legs come back against the cable during ground operation.

   The rudder-attachment end may get damaged during transit or during storage. In either case, it is dangerous to straighten the cable ends and continue flying, since it would then be possible for the cable to fail in flight, leaving only the spoilers for back-up directional flight control.

4. Safety rings: When operating in tall grass fields, watch the safety rings. The lower rings have been caught and pulled out in some operations of this type. Pay special attention to the main-gear rings and the lower tail-wire rings.

5. Propeller cracks: Pay close attention to the hub area, when you pre-flight your propeller. Some propellers have developed cracks close up to the hub, that were not noticed during the pre-flight inspection. There is a tendency only to check the leading edge and the blade-tips.

6. Rotax magneto flywheel nut: On both the 377 and the 503, you should re-torque the magneto flywheel nut to 60 foot-pounds (8.3 kg-m) after the first 50 hours of use and every 100 hours thereafter. If the flywheel nut is loose, remove it and reinstall it with Locite 242. This is also the time to check your ignition timing.

7. Carburettor jetting: Where weather conditions differ greatly between summer and winter, carburettor jetting requirements may possibly be different for these seasons, though in Britain this may not be a problem.
Check with your dealer for information on the correct jets for your engine in your particular operating conditions.

8. Throttle technique: You should not allow your engine to operate at 'idle' power in flight for more than five seconds without 'clearing' the engine. To do this, advance the throttle smoothly to 4000 r.p.m. and return to idle. This will prevent the engine from loading up with fuel during long descents or in the traffic pattern.

Clearing the engine is especially important in the landing pattern. If you allow the engine to load up with fuel during long descents or a landing approach, the engine will not have sufficient response to execute a 'go-around', if you should need to do so.

Clearing the engine is a time-tested technique used throughout the world of piston-powered flight. You can only gain from using it.

9. Flying-wire shackle: Check these carefully for wear and, if necessary, replace them. Be careful to use the correct shackle, appropriate to your particular machine.

10. King-post channel: The king-post channels on some Stearman aircraft have become cracked and split at the bend. The K314 used for training seem to have the highest incidence of these failures, most likely due to the hard landings that accompany flight-training operations.

In all of the failures reported to date, the king-post remained in place, held by the sail and the fuel tank. In two of the reported cases, the failure went unnoticed for several flights, because the king-post channel was not checked during the pre-flight inspection. For safe flying, it is critical that pilots learn the pre-flight inspection procedure set out in the owners' manual. These inspections should be performed thoroughly before EVERY flight.

Before each flight and after any hard landing, examine the king-post channel for cracks. Also check the channel at the end of each day's flying. Look closely at the base of the channel, where the bend occurs, for any sign of cracking.

Stearman actually up-graded the strength requirements of the king-post channels to increase the durability of this very important structural component. Any machine bought before October 1983 will definitely need a new king-post channel.

Cracks also appeared at the trailing edge of the root tube, where the channel bolt holes are drilled. Again, this problem is most severe on K314 trainers. If your machine is more than one year old or has logged more than 200 hours, it is strongly recommended that you contact a competent firm about getting a root-tube rebuild done, during which a 5/16 inch bumper washer will be placed under the head of the trailing-edge bolts inside the root tube.

If left rigged for any length of time, the king-post detunes. Check for any slackness in the associated rigging.

11. Gyroscopic engines: The timing was changed on some engines. Wrong timing will make engine overhear.
Description: Cuyuna Service Newsletter (continued)

D. Authorized Cuyuna Service Dealers

We are now in the process of setting up Authorized Cuyuna Service Dealers. We have been sending out application forms to many dealers from all parts of the country that have called in enquiring about this program. If you have dealers interested in this program they should contact the Cuyuna Service Department. A packet of information will be sent to them which explains the program.

E. Safe Engine Operating Temperatures

There are two means of checking engine temperature during operation. One is to use a cylinder head temperature gauge and the other is to monitor exhaust temperature.

In either case, the gauge should be attached as explained below. Maximum temperature "red line" points are also given.

(a) Cylinder Head Temperature

Temperature should be taken off the P.T.O. cylinder. Maximum temperature is 425°F. The red line on the gauge should be placed at 400°F which permits a margin of safety.

(b) Exhaust Temperature (E.G.T.)

The exhaust temperature should be monitored off the P.T.O. cylinder. Install the probe in the exhaust manifold, 1½ - 2" from the gasket surface of the manifold flange. Maximum temperature should not exceed 1250°F.

Description: Overtightening King Posts

It has come to our attention that some Quicksilver owners have been overtightening King Posts.

Overtightening the King Post is like overtightening a bolt or any other airframe member. The King Post should be brought up tight, i.e., "tightly snug" but overtightening is structurally harmful.
Service & Maintenance Bulletin

VOL 4

Issue Date: 1 January 1983
DLR. Manual Sect. No.: 4
Total No. of Pages: 1 of 1

Description: Main Wing Ribs

It is possible under certain conditions of load and wear for the main wing ribs to be extracted from their sleeves. Although these conditions seldom occur we are in the process of redesigning an end piece which will eliminate the possibility of any rib backing out of its sleeve. For aircraft currently operating there is a simple way to prevent this from happening. Page 2 of this bulletin shows how to reposition the end piece on the ribs so that all loads will force the rib tight against the trailing edge spar when the wing is led in flight.

If one of the inboard ribs were to back out far enough it could engage the propeller with potentially catastrophic results. Therefore, we further recommend that the four inboard ribs be secured by drilling a hole through the end of the rib and tying it against the trailing edge spar with safety wire.

Because of the serious results of the inboard ribs backing into the prop, it is important that the actions recommended here be performed immediately on the four inboard ribs. The others may be attended to as soon as practical.

Service & Maintenance Bulletin

VOL 4

Issue Date: 30 November 1982
DLR. Manual Sect. No.: 4
Total No. of Pages: 1 of 1

Description: Vibration Wear On All Quicksilver Models

It has come to our attention that many planes are not being inspected for vibration wear. The manual calls for an inspection on most parts every 100 hours. This inspection is especially important on planes that are never taken apart for storage or transport. A preflight inspection will not uncover vibration-worn parts.

Vibration wear can be reduced by only flying a plane which has its rotating parts balanced as accurately as possible.

The following is a list of parts which should be checked for wear:
1. Pin shanks - both 3/16" and 1/4";
2. All channel holes;
3. All holes in tubing;
4. Bolt shanks;
5. Plastic saddles where they rub against aluminum;
6. Cable thimbles;
7. Clevis pins;
8. Safety pins and safety rings;
9. Where the lower tail wires rub the tail brace tubes. This problem can be eliminated by installing two cable guides, part number 91118.

Check other parts that seem loose or cannot be kept tight.

VOL 4

Issue Date: 22 December 1982
DLR. Manual Sect. No.: 4
Total No. of Pages: 1 of 1

Description: Root Tubing, All Models

THE FOLLOWING SHOULD BE ADDED TO THE AIRFRAME MAINTENANCE SCHEDULE IN THE OWNER'S MANUAL FOR ALL QUICKSILVER MODELS.

Every one hundred hours, the entire surface of the 2" square aluminum root tube should be inspected for cracks. In particular, attention should be paid to the ends and all bolt holes. Also, inspect for wear caused by the rubbing of channels against the root tube.

The root tube should be replaced every 200 hours on the MX II (two-seater).

The root tube should be replaced every 300 hours on all Doublequick, MX and QE models.

Super aircraft Inc. 1080 Linda Vista Drive, San Marcos, CA 92069 (619) 744-1514, Telex: 496-0565
Service & Maintenance Bulletin

VOL 4

Issue Date: 7 October 1982
DLR Manual Sect. No.:
Total No. of Pages: 1 of 2

Description: Cuyuna Service Newsletter

A. Advance Spring Removal

We have had reports of hard starting from the field on both the 215 and 420 engine models. In some cases, the customers complain of backfiring through the carburetor and having to pull the engine through ten to fifteen times before the engine will start. We have found that the problem is caused by having the engines timed to the new timing specification.078° - 078° B.T.D.C. in the full advance position. This leaves the ignition timing at 09° B.T.D.C. in the retared position, as the spring returns the ignition cam to the full retarded position when the engine is stopped, making the engine difficult to restart.

SOLUTION: To improve starting, we are suggesting that the spring be removed on the use having a starting problem. The timing was changed on engines built at the factory starting with Serial Number 12440. The spring has been removed from all engines starting with Serial Number 15808 during production.

B. Service Tools

Three new tools are being added to the service tool line. They are as follows:

1. Spanner Wrench, Part Number 444-31-806-000
   Used to hold the crankshaft while removing and tightening the flywheel nut during engine rebuilding.

2. Wrist Pin Puller, Part Number 444-31-806-895
   Used to remove the wrist pin from the piston during engine disassembly. It is a must for wrist pin removal.

3. Flywheel Puller, Part Number 444-31-843-28
   This tool can now be used to remove the flywheel from the engines using either the original points system or C.D. ignition.

C. Oversize Pistons

Oversize pistons and rings are now available through the Cuyuna Parts Department. The piston and ring set is .020 oversize and the Part Numbers are as follows:

Piston .020 oversize Part Number 438-05-819-000
Rings .020 oversize Part Number 000-02-135-000

Cylinders should be bored at a shop fully equipped to do such rework. Bore the cylinder so there is .005 cylinder wall to piston skirt clearance. The piston should be on hand and checked for size before the cylinder is bored. This will assure proper clearance. When checking the piston for size, remember it is largest at the bottom and should be milked for size 1/4" up from the bottom of the skirt, 90° to the wrist pin.

After the cylinder is bored and honed, scrub the cylinder wall with a brush, hot water and detergent. Dry and oil cylinder wall to prevent corrosion.

MX-2, 10 May 1982
DLR Manual Sect. No.:
Total No. of Pages: 1 of 1

Description: MX 2-Place Drive Shaft

Due to possible problems of the MX 2-Place drive shaft from constant high RPM use, all MX 2-Place must be grounded immediately until we are able to supply you with a higher strength drive shaft. This will be supplied free of charge.

We will keep you updated on the situation. We anticipate receiving parts within the next two weeks.

VOL 4

E-82-10A

Issue Date: 15 May 1982
DLR Manual Sect. No.:
Total No. of Pages: 1 of 1

Description: Quicksilver E - Engine Mount Angle

Some of the engine mount angles (left, right or both) were drilled incorrectly. If proper alignment cannot be achieved, contact Customer Service for replacement parts.

Order Part Number 8055, Engine Mount Angle-L-Quick E; Part Number 8056, Engine Mount Angle-R-Quick E, or both. These parts will be supplied free of charge.

VOL 4

ALL-82-15A

Issue Date: 16 June 1982
DLR Manual Sect. No.:
Total No. of Pages: 1 of 1

Description: Self-Locking Nuts

The AN 582 Self-Locking Nuts (four Part Numbers 10500, 10510, and 10540), supplied by Epper-Formation, Inc., are manufactured to the exacting federal specification QQ-P-416A. However, it is possible for imperfect parts to pass required inspection.

During the time period of April 1, 1982 to June 1, 1982, a small quantity of 3/8" locknuts were shipped out which were manufactured without the proper locking feature. Common sense dictates that when constructing an aircraft, you should be certain that the self-locking feature of ALL AN Locknuts is intact and provides adequate friction for vibration resistance.

Y-11-1-82-17A

Issue Date: 1 October 1982
DLR Manual Sect. No.:
Total No. of Pages: 1 of 1

Description: All Quicksilver® Weightshifts

Due to ground handling and heavy weather abuse when aircraft are tied down, we highly recommend that ALL weightshift Quicksilvers (Yamaha, Doublequick, Quicksilver II) be equipped with the new belly bar and tail brace kit. This will increase the structural capacity of the aircraft to offset these kinds of conditions and abuses.
**SERVICE BULLETIN FORMAT**

Service Bulletins issued by Eipper Aircraft come on one of these forms. The issue date is given in the title block and the Service Bulletin number is under the aircraft on the upper right hand corner. The bulletin number indicates which models are affected by the bulletin, what year it was issued, and if this bulletin is a revision of an earlier Service Bulletin.

**MODELS AFFECTED – YEAR ISSUED NUMBER – REVISION**

<table>
<thead>
<tr>
<th>Model</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>MX</td>
<td>Single surface</td>
</tr>
<tr>
<td>MXL</td>
<td>Double surface</td>
</tr>
<tr>
<td>MXII</td>
<td>Two place trainer</td>
</tr>
<tr>
<td>Y</td>
<td>Yamaha powered weightshift</td>
</tr>
<tr>
<td>D</td>
<td>Doublequick (Cuyuna powered)</td>
</tr>
<tr>
<td>E</td>
<td>215 cc Cuyuna powered weightshift</td>
</tr>
</tbody>
</table>

**YAMAHA DRIVE BELT TENSIONING AND TRACKING ADJUSTMENT**

Your Yamaha Engine System may require periodic adjustment to the belt drive system. After the initial 1-2 hour run in period, check belt tension by applying an approximate 4 lb. load to side of belt. Deflection should be approx. 3/32". If belt is too loose, apply shims (washers) between factory fender washers and bearing (see illustrations). Shim bearings on one side for small adjustments - both sides for large adjustments. Do not shim just the forward bearing or the aft bearing. Shim one side of both bearings (small adjustment) or both sides of both bearings (large adjustment).

After adjusting belt tension, check belt tracking in the following manner: Alternately rotate drive shaft counter-clockwise and clockwise (looking from prop end of shaft forward). The belt should track in the center of clutch sprocket. If belt tracks forward or aft during the clockwise cycle, and take the following steps: (1) loosen the four 8x75mm engine mount bolts several turns, (2) unbolt rear Sealmaster bearing from rear mounts, (3) if belt is tracking aft on clutch sprocket (away from engine) move rear of shaft to the left approximately 1" (t" to the right if belt tracks forward), (4) re-tighten the four engine bolts, making sure shaft is held off center, (5) bolt Sealmaster bearing back in place, (6) re-check tracking and repeat above steps offsetting shaft up to 2" if necessary.

**Yamaha Bearing Mount Plate and Belt Adjustment Y101**

Several occurrences of rear bearing carrier cracks have prompted a reinforced welded replacement part which is now available. All Yamaha Powered Quicksilvers® with NTN Bearings (no rubber around bearing) should be inspected, and the new carrier installed as shown on the following page.
All aircraft, when tied down, should have the nose wheel tied firmly to the ground. The aircraft should not be left outdoors with the tail resting on the ground. High winds can cause the boom tubes to break. Also, extended abuse of moderate winds can cause the tubes to break.

It has been reported by a few customers that the lower fan belt pulley halves have cracked. Apparently, under certain circumstances the three screws that secure the pulley halves may “bottom out” in the flywheel before the halves are drawn tight, thereby allowing the halves to fatigue.

If the engine is run with cracked pulley halves, damage to or failure of the fan belt may occur resulting in engine overheating and possible seizure.

Inspect all pulley halves and replace if required. Install NEW split lockwashers under the three screws holding the pulley halves. Discard OLD wave washers.

This directive is applicable to all Cuyuna 430R and 430D engines with any serial number except serial numbers after 10,359 which are stamped on the aluminum serial plate with the manufacturer being identified as Cuyuna Development Company.

**INSTALLATION AND INSPECTION INSTRUCTIONS**

1. Remove the four screws, wave washers and retainers holding the recoil starter assembly.
2. Remove the recoil starter assembly noting the orientation of the starter handle.
3. Remove the nut and lockwasher holding the starter cup.
4. Remove the starter cup.
5. Remove the three screws and wave washers holding the lower pulley halves.
6. Discard the three wave washers.
7. Remove and inspect the two lower pulley halves for any unusual wear or cracking (see diagram).
8. If any unusual wear or cracking is seen, replace the lower pulley half.
9. Install lower pulley halves.
10. Install the three screws using the NEW split lockwashers and torque to 8 to 10 lb/ft, while turning up the crankshaft to allow the fan belt to center and tension properly.
**Service & Maintenance Bulletin**

**VOL. 4**

**Issue Date:** 15 April 1981

**Description:** Cuyuna Rear Shaft Bearing

On all DOUBLEQUICK and MX models powered by Cuyuna engines the rear shaft bearing must immediately be changed to Sealmaster LP-16 bearing.

Shaft alignment with root tube should be inspected and 3/8" spacer block may have to be removed. The LP-16 bearing will be required for new reduction units which will be available approximately 8/1/81.

It is recommended that all Cuyuna engines at that time be converted to the reduction unit due to excessive noise created by direct drive systems. Also, engine life is enhanced due to reduction system. The LP-16 is available from your dealer.

**VOL. 4**

**Issue Date:** 22 July 1981

**Description:** Seat Mount Assembly

During the period March 1981 through June 1981 some MX's were shipped with seat mount assemblies that may cause cracking in the fiberglass seat around the two aft bolt connections. If you have an MX equipped with the seat mount assembly shown in figure 1 below, please return it to your dealer immediately and you will receive the proper replacement free of charge. Please do not allow the aircraft to be flown until the seat mount assembly is replaced.

11. Install the starter cup (note dimples to fit over screw heads) using the lockwasher and nut and torque to 44 to 50 lb./ft.

12. Install the recoil starter assembly with the starter handle in the original orientation using the four retainers, wave washers and screw and torque to 8-10 lb./ft.

**Figure 1**

Incorrect

**Figure 2**

Correct
**Service & Maintenance Bulletin**

**Description:** MX Push/Pull Tube

The possibility exists that under certain rough field operations, particularly hard landings, the elevator push/pull tube may come in contact with the propeller tips. This can result in a broken or split propeller. **This temporary modification shown below should be made immediately to all MX aircraft. Tie a piece of control line (1" dacron) or similar material between the push/pull tube and the beginning of the center bend of the rear axle.** This will help eliminate any possibility of prop to push/pull tube contact and will not interfere with elevator control.

**NOTE:** The Push/Pull Safety Cable Assembly is retrofit and available February 8, 1982 from your local Eipper dealer.

Part No. 20631
Service & Maintenance Bulletin

VOL 4
Issue Date: 23 October 1981
DLR, Manual Sect. No.: 4
Total No. of Pages: 1 of 1

Description: MX Elevator Pivots

Due to the possibility of 3/16 pipe pin ball lock failure in MX elevator hinges, one of the three modifications given below should be implemented immediately.

1. Drill 1/16" diameter hole 3/32" from shaft end and install safety pin or safety ring.
2. Substitute 3/16" x 3/8" clevis pin (AN 394-13) and safety ring.
3. Substitute AN3-5A bolt with locknut.

VOL 4
Issue Date: 12 November 1981
DLR, Manual Sect. No.: 4
Total No. of Pages: 1 of 1

Description: 560-8M Cymuna Drive Belts

The 560-8M drive belts on Doublequick and MX model Quicksilvers should be replaced every 25 hours. It should be inspected before each flight to check for excessive wear and/or delamination (cracking of the teeth). If there is any visible sign of wear, the belt should be replaced immediately. See chart below for proper belt tension.

1. Place belt on sprockets and adjust takeup so belt teeth mesh securely with sprocket grooves.
2. Measure belt span "t".
3. Tighten belt so it deflects 1/64 inch for each inch of belt span when a force is applied as specified in table below.

NTD BELT DEFLECTION FORCE TABLE

<table>
<thead>
<tr>
<th>Belt Pitch</th>
<th>Belt Width</th>
<th>Force (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 mm</td>
<td>30 mm</td>
<td>6</td>
</tr>
</tbody>
</table>

Deflection 1/64" per inch of span

A potential problem exists on all MX teleflex rudder cables. If heavy pressure is put at the extreme left or right stop on the control stick, it may be possible for the teleflex rod to come far enough out of the sleeve to jam.

Effective immediately, a 10-32 nut should be threaded all the way to the end of the threaded portion of both rod ends and locked tightly. This will prevent either end of the rod from going beyond the maximum travel allowed.

10-32" Nut

Sleeve

Rod

Rod Seal

(Topper Aircraft Inc. 1090 Linda Vista Drive, San Marcos, CA 92069 (619) 744-1514, Telex: 499-0565)
3/16” Locknuts

During the period October 1, 1981 to December 15, 1981, a small quantity of 3/16” locknuts were sent out which were manufactured without the proper locking feature. Check all 3/16” locknuts for locking friction. Common sense dictates that when constructing an aircraft, ALL locknuts should be checked for proper locking ability.

Cuyuna Reduction Root Tubes

Some Cuyuna reduction root tube assemblies shipped before August 20, 1981, may develop excessive prop shaft bearing friction. This should be checked by removing the drive belt and rotating the prop shaft several revolutions. Mild friction and resistance is normal. If any grinding or other high friction condition is encountered, please contact your dealer.

Yamaha Expansion Chamber Modification

Some Yamaha expansion chambers that have a snap ring hold silencer cartridge should have this modification implemented immediately.

A Plastic plug for the ensuing extra hole is available free of charge by writing Elppor at 1080 Linda Vista Drive, San Marcos, CA 92069, Dept. DMSB, Ref. #010982-20.

Notes: The new holes relieve pressure on the nose struts for easy assembly.
### Cuyuna Exhaust System

This service bulletin supersedes the service bulletin dated March 3, 1982. Eipper has changed its original policy concerning the problem with the old style Cuyuna exhaust systems. In an effort to keep your customers happy and keep them in the air, we have decided to issue, free of charge, the Cuyuna 430-D muffler, Part Number 60105, the F-header pipe, Part Number 60118, and the mounting hardware kit, Part Number 60197. This is for aircraft shipped from December 1, 1981 through March 5, 1982 and have had the ball run through their exhaust per the January 9, 1982 Service Bulletin. You have until April 15, 1982 to order the new exhaust system at no charge. Customer pays freight.

If, the engine requires a new piston, rings and base gasket (Part Nos. 438-05-818-01, 03042-154-32 and 1-338-07-088-02), respectively, these will be free of charge. Customer must pay freight charges. You have until March 25, 1982 to order the piston, rings and gasket at no charge.

For the Cuyuna powered aircraft shipped prior to December 1, 1981 and which have had the ball forced through their exhaust system, Eipper will supply the new 430-D muffler, F-header pipe and mounting hardware kit for $50 including freight. The $50 offer will be good only upon receipt of a written order with a signed statement from the dealer and the customer to the effect that the ball had been forced through the new exhaust pipe (see attached form). You have until April 15, 1982 to order the new muffler system for $50 including freight. Although not necessary, you may order the new muffler system for all Cuyuna powered aircraft have not had the ball forced through them at standard dealer price. Included with each new muffler system is a 280 and 320 main jet. These new muffler systems are installed the carburetor must be jetted accordingly for your particular altitude and temperature. When installing the muffler system, it is your responsibility as an Eipper dealer to make sure the carburetor is jetted correctly. If you follow these simple rules, jetting the carburetor can be very easy.

Install a cylinder head temperature gauge on the rear cylinder, and an RPM gauge. Warm up the engine at low RPM for five minutes. After five minutes are up, run the engine at full throttle for two minutes. If the engine does not exceed 6500 RPM and 400°, your top-end carburation should be correct. Next, repeat the above warm up procedure and run the engine between 5400 and 5700 RPM for two minutes. Again, if the carburetor is jetted correctly, the engine should not exceed 400°. Also, after performing these tests, always check your spark plugs for correct burning.

We know the combination of this new muffler and proper jetting leads to a happy, healthy engine as we at Eipper no longer worry about running temperature gauges on our engines and we have full confidence in our airplane's cross country ability without such gauges. This assistance to your customers in performing the above operations will lead to a happier relationship all around.

**NOTE:** All "no charge" or special price orders per this bulletin will not be accepted without the original invoice number.

### 3/16" Locknuts

During the period February 1, 1982 to April 1, 1982, a small quantity of 3/16" locknuts were sent out which were manufactured without the proper locking feature.

Check all 3/16" locknuts for locking friction. Common sense dictates that when constructing an aircraft, ALL locknuts should be checked for proper locking ability.
Description: MX Rudder Balance Tab

All MX rudders built before October 1981 have balance tab attachment fittings that may allow slight dynamic flexibility. Although not dangerous, rudder trim pressure may wander slightly. Eipper has available a rudder balance tab stiffener kit that eliminates any flexibility. The kit consists of a new rudder leading edge, rudder compression strut, aluminum tube connectors and other miscellaneous hardware.

To order the Rudder Stiffener Kit use Part Number 20444. Suggested Retail - $17.05

Description: Self-Locking Nuts

The AN363 Self-Locking Nuts (our Part Numbers 10506, 10510, 10540) supplied by Eipper are manufactured to the exacting Federal Specification QQ-P-416A. However, it is possible for imperfect parts to pass required inspections.

After installation of self-locking nuts, inspect carefully for hairline cracks and other obvious defects. Also, as stated in Service Bulletin "3/16" LOCKNUTS", dated April 7, 1983, be certain that the self-locking feature of all AN locknuts is intact and provides adequate friction for vibration resistance.

Description: New 430D Mufflers, Part Number 60105

Some of our initial purchase of the new 430D mufflers may have been incorrectly welded. Should problems arise from this, i.e., muffler breakage, these units will be replaced free of charge.

For replacement, these mufflers must be sent back to the factory by May 31, 1982. Please contact your dealer to return these parts.

Description: Seat Mount Assembly - MX Part Number 70390

It has come to the attention of Eipper that possible fatigue of the MX seat mount assembly (see drawing below) could occur if a hard take-off or landing has occurred and that the possibility is greater if the pilot weighs over 200 pounds.

You should always inspect your aircraft for damage should you encounter a hard take off or landing. To help avoid the above possible problem, Eipper now makes the seat mount assembly out of chrome alloy steel. It is recommended that all aluminum seat mount assemblies be replaced.

For all Quicksilver MX Aircraft purchased by customers prior to March 30, 1982, the chrome alloy seat mount replacement is available for a special price of only $35.00. The Part Number for ordering is 70390.

For all Quicksilver MX aircraft "shipped" by Eipper since March 30, 1982, or "purchased" from a dealer since March 30th, 1982, the seat mount assembly will be replaced by Eipper free of charge. Orders for free Seat Mount Assemblies will be accepted only when the original Eipper "Sales Order Invoice Number" is supplied by the dealer and "proof of Purchase" from the customer.

Price good through September 15, 1982.
Description: V-Belt Drive Assembly

Due to possible drive shaft fatigue on "V-Belt" Drive aircraft, the following kit should be ordered immediately.

V-Belt Reduction Shaft/Bearing Kit
(see attached list for kit contents)

Part Number: 90627

Price: $78.00

This kit retrofits to a V-Belt Drive Assembly and helps eliminate problems caused by extended high RPM use and incorrect belt tension.

For all V-Belt Drive Assemblies "purchased" from a dealer since March 22, 1982, or "shipped" by Epper since March 22, 1982, the V-Belt Reduction Shaft/Bearing Kit will be available free of charge. Orders for the free V-Belt Reduction Shaft/Bearing Kit will be accepted only when the original Epper "Sales Order Invoice Number" is supplied from the dealer and "Proof of Purchase" from the customer.

NOTE: If the V-Belt Drive Assembly has been installed on a Doublequick or MX with the old style reduction root tube that has the welded rear prop shaft bearing collar (see drawing below), then the reduction root tube should also be replaced. The part number for a new reduction root tube is 40145 and is available for a special price of only $120.00.

Prices good through September 15, 1982.
Claim for no charge parts honored through September 15, 1982.
Description: Skid Attachments

It is possible for the shock cords on the standard Elpor skis to become wet and freeze. Once the shock cords freeze they lose their elasticity and become very weak. The weakened shock cords may then allow the skis to drop to an unsafe tip down configuration.

In order to ensure that the skis do not drop their tips, a safety line should be attached from the tip to the shock cord attach point. This safety line should allow the ski to rotate thru its normal range of travel but prevent the tip from falling in the event the shock cord fails.

Before each flight on the skis, check the shock cords to ensure that they remain elastic. This is especially true if the aircraft has been out overnight.

NOTE: Safety cables are attached to same locations as the shock cords, but are slack enough to allow normal movement.

FUEL PUMP MOUNTING MX II

The fuel pump mounting has been changed, but your instructions will not reflect this yet. DO NOT MOUNT THE FUEL PUMP TO THE ENGINE. Mount the fuel pump to the left engine angle mount. Drill two 1/4" holes in the left angle as shown below and mount fuel pump using AN4-10a bolts and hardware on the underside of the mount angle.

PART   QTY.    DESCRIPTION
10056  2      AN4-10a
10510  2      1/4" Locknut
10560  4      1/4" Washer

Torque:

- Engine Angle Mount: 20 in lbs.
- Fuel pump to engine angle: 20 in lbs.

FUEL LINE TO CARB.  FUEL LINE FROM TANK.
SUPPLEMENT
TO PARTS LIST AND ASSEMBLY INSTRUCTIONS

50

FUEL PUMP MOUNTING

The fuel pump mounting has been changed, but your instructions may
not have been changed yet. DO NOT MOUNT THE FUEL PUMP TO THE ENGINE.
Mount to the intake manifold using the existing bolts and two 90 degree
tangs. One tang has to be drilled out to 5/16".

<table>
<thead>
<tr>
<th>PART#</th>
<th>QTY.</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>10024</td>
<td>2</td>
<td>AN3-10a</td>
</tr>
<tr>
<td>10550</td>
<td>4</td>
<td>3/16&quot; washers</td>
</tr>
<tr>
<td>20365</td>
<td>2</td>
<td>90 degree tangs</td>
</tr>
</tbody>
</table>

**NOTE:** Tangs point in opposite directions.
Service & Maintenance Bulletin

Description: 777 Rotax Engine Fuel Pumps

The fuel pump on existing Rotax engines is mounted to the side of the engine block. On hot days it is possible for the fuel pump to become overheated and boil the fuel (vapor lock). Rotax equipped aircraft should not be flown until the fuel pump is remounted as shown in the diagram below.

1. Disassemble CONTROL STICK from STICK ATTACH TUBE and discard old AN4-30a bolt.
2. Next drill out the following items to 5/16" (7.94 mm) so the new AN5-30 STICK ATTACH BOLT can be installed: 7/8" SADDLE (20265) 2 each, 1 x 1/8" SADDLE (20270) 2 each, 1 x 1/8" NYLON WASHER (20345) 1 each. Existing STICK ATTACH HOLES on the STICK ATTACH TUBE and CONTROL STICK.
3. Reassemble CONTROL STICK to STICK ATTACH TUBE as shown below and tighten THIN LOCKNUT until COTTER KEY can be installed through hole in bolt.

NOTE: Tangs point in opposite directions.

Current Subject of Some Discussion

Veto Lopez
31-12-85
**Service & Maintenance Bulletin**

**FUEL TANK RUBBER SEAL**

Several of our customers have reported that the new rubber fuel tank seals for the bottom three fittings on the fuel tank have been cut by vibration against the edge of the fuel tank hole. This in turn allows fuel to leak or spill from around the seal onto the pilot and engine. This problem has only surfaced with the new tank seals shipped after April 1983.

To prevent this from happening it is necessary to bevel the corners on the inside edges of the plastic fuel tank holes so that there are no sharp edges on the lip of the holes. You will be able to determine if you have one of the new seals by measuring the width of the rubber collar on the outside of the tank. The old seals have a width of 1/8" while the new seals have a thicker 1/4" collar (see the diagram below).

If you have one of the new seals on your tank we recommend that you remove the seals and use a small knife or sand paper to round out the edge on the inside of the tank hole. Inspect your seals for damage or cuts along the base of the collar and if damaged replace them.

**MXII CONTROL STICK**

The MXII control stick bolt is being replaced with a 5/16" AN5-30 bolt. Because the control stick is subject to abnormal abuse as a student training aircraft, the Epper Engineering department recommends upgrading the bolt to an AN5-30 (#10333). Instructions for making this change are included on the second page of this bulletin. Epper will soon be sending retrofit kits with the parts necessary for this change. In the meantime all MXII owners or operators are directed to replace the AN4-30a control stick bolt (Epper part #10270) with a new AN4-30a bolt every 20 hours until Epper ships retrofit packages and assembly manual supplements.

**RETROFIT PARTS LIST**

<table>
<thead>
<tr>
<th>PART #</th>
<th>QTY</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>10332</td>
<td>1</td>
<td>AN 5-30</td>
</tr>
<tr>
<td>10570</td>
<td>1</td>
<td>5/16 washer</td>
</tr>
<tr>
<td>10541</td>
<td>1</td>
<td>5/16 castle nut</td>
</tr>
<tr>
<td>10635</td>
<td>1</td>
<td>cotter key</td>
</tr>
</tbody>
</table>

**REMOVE & REPLACE**

<table>
<thead>
<tr>
<th>PART #</th>
<th>QTY</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>10270</td>
<td>1</td>
<td>AN 4-30A</td>
</tr>
<tr>
<td>10560</td>
<td>2</td>
<td>1/4 washer</td>
</tr>
<tr>
<td>10510</td>
<td>1</td>
<td>1/4 lock nut</td>
</tr>
</tbody>
</table>

**THROTTLE TECHNIQUE**

You should not allow your engine to operate at idle power in flight for more than 5 seconds without "clearing" the engine. To clear the engine, advance the throttle to 4000 RPM and return to idle. This will prevent the engine from loading up with fuel during long descents or in the traffic pattern. Clearing the engine is especially important in the landing pattern. If you allow the engine to load up during a landing approach the engine will not have sufficient throttle response to execute a go-around. Whenever you are on an approach to land, clear the engine every 5 seconds to ensure a go-around capability. Clearing the engine during descents is a time tested flying technique practiced throughout the piston powered aviation world. Incorporating this technique into your flying habits will make you a smoother and more confident pilot.
Description:

PREVENTIVE MAINTENANCE TIPS

A few trends in mechanical problems have become evident this summer which can be avoided by the following preventive maintenance practices.

CORK FUEL CAP SEALS - Some of the cork fuel cap inserts are flaking and contaminating the fuel. In theory these fragments should float. Some pieces have however managed to block the fuel lines. Check your fuel cap seals and replace them if they show signs of flaking.

COURSE THREAD BOLTS - All of the course thread bolts on your aircraft should have loctite 290 or 242 applied when they are installed, and again if they are removed for inspection. As a rule you should loctite every bolt that is not secured by a locking nut or a safety ring. If you have purchased a used aircraft remove and inspect all of the wing bolts. Discard any that show signs of bending stress and loctite the rest back into place.

TELEFLEX CABLES - Do not Straighten the ends on Teleflex cables. The cable is sometimes bent at the stick attach point when the pilot's legs come back against the cable during ground operations. The rudder attach end may be damaged during transport or storage. In either case it is dangerous to straighten the cable and continue flying since it would then be possible for the cable to fail in flight, leaving only the spoilers for back-up flight control.

SAFETY RINGS - When operating in tall grass fields watch your safety rings. The lower rings have been caught and pulled in some bush operations. Pay special attention to the Main Gear rings and the lower tail wire rings.

PROPeller CRACKS - Pay close attention to the hub area when you prestitch your propeller. Some props have developed cracks close to the hub which are not caught during prestitch. The tendency is to check only the leading edge and tips.

ROTAX MAGNETO FLYWHEEL NUT - On both the 277 and the 503 you should retorque the magneto flywheel nut to 60 ft-lbs after the first 50 hrs of use and every 100 hrs thereafter. If the flywheel nut is loose remove it and reinstall with loctight 242. This is also the time to check your ignition timing.

CARBURETOR JETTING - It is important to remember that carburetor jetting requirements change with the air density. This means that your carburetor jetting may have to be changed from winter to summer. Check with your dealer for more information on the correct jetting for your operating conditions.
Description:
We recommend that all Bing carburetors with the guide pins be replaced. To determine which carburetor you have on your aircraft check the diagrams below. The arrows contain enlargements of a fitting on the choke side of the carburetor. You will need to replace your carburetor if there are two small circles or pins in the fitting on the side of the carburetor. If you have purchased a Rotax equipped aircraft with slide guide pins in the carburetor please contact your dealer about exchanging the carburetor for one with guide ridges.

REPLACE

MATERIALS NEEDED
- 3 Locknuts 4" PN 10510
- 5 Locknuts 5/16" PN 10540
- 2 Locknuts for the 6" pulley bolts (PN 10540 or PN 10507)
- 1 Loc-tite 242
- 2 Fender Washers 5/16" PN 10600

The following may need to be replaced or updated
- New solid PROP SHAFT PN 61056 (replaces old model hollow prop shaft)*
- AFT BEARING (PN 60014 ER-16T)
- INNER BEARING (PN 60013)

* note If you replace the PROP SHAFT you will need to drill a new hole in the Root Tube to secure the bearing sleeve.

TEARDOWN PROCEDURE TO INSTALL 5/16" FENDER WASHERS ON THE ROOT TUBE CHANNEL BOLTS

1. Remove the propeller
2. Remove the drive belts and remove the adjusting bolts
3. Remove the 6" pulley (may require a puller) * note If you have a hollow prop shaft you will have to reinstall the prop retaining bolt (An5-17a) to prevent the puller/from pressing the propshaft insert plug into the prop shaft
4. Clean the rust and locktite off of the prop shaft so that it is smooth enough for the AFT BEARING (PN 60014 ER-16T) to slide off of the shaft.
5. Loosen the set screw on the AFT BEARING from the LOCKING COLLAR (PN 60014)
6. Remove the LOCKING COLLAR
7. Remove the An4-24a bolt (PN 10220) located 13 inches forward of the root tube end. Check for wear grooves on the bolt.
8. Remove the An4-10a's (PN 10270) that hold the BEARING BRACKET in place
9. Remove the BEARING END BRACKET assembly (PN 60540). This may be difficult and require using a wooden block to strike the bracket. Do not strike the end of the prop shaft.
10. Put a rope through the prop shaft end hole and push the prop shaft into the Root Tube past the rear channel attach bolt holes.

11. Remove the 2 An5-6a rear spar channel bolts (PN 10304).

12. Pull the propshaft assembly out of the Root Tube.

13. Perform a dye penetrant check on the rear of the Root Tube to check for invisible cracks around the bolt holes. If you find cracks you will need to replace the Root Tube (PN 40142).

14. Check the AFT BEARING ASSEMBLY (PN 60004) and the INNER BEARING (PN 60003) by rotating them with your fingers. If you feel any sign of roughness at all you will need to replace the bearing. Remember these bearings support the propeller turning at 3000 RPM. Any rough spots will generate heat which will eventually fail the bearing.

15. Check the press fit between the front of the PROP SHAFT (PN 61056) and the INNER BEARING (PN 60003). This is a light press fit which should not have any play from side to side.

16. Check that the prop shaft runs true in the INNER BEARING. If it wobbles visibly replace the shaft.

17. Put the prop shaft bearing assembly back into the Root Tube past the rear channel holes. Be sure to align the BEARING SLEEVE holes horizontally so they will align with the Root Tube holes to be used latter for the An4-24a (PN 10219).

18. Install the rear channel bolts with 5/16" FENDER WASHERS (PN 10660) under the head of the bolts on the inside. During the reassembly process be sure to use new locknuts on all of the bolts.

19. Pull the PROP SHAFT ASSEMBLY out slowly until the BEARING SLEEVE (PN 60010) holes line up with the holes in the Root Tube. Install the An4-24a (PN 10219) and remove the rope previously installed. If you have replaced the prop shaft you will need to position the prop shaft 4 7/8 inches from the locking collar to the center of the hole in the prop shaft. You will then drill the new root tube hole 7/8 inches forward of the rear edge of the root tube. The hole will be drilled through the root tube and the bearing sleeve (PN 60010).

20. Install the BEARING END BRACKET.

21. Install and tighten the LOCKING COLLAR.

22. Carefully align the 6" pulley with the drive shaft pulley and locktite it into place.

23. Install the belts, adjusting bolts and propeller.
Service & Maintenance Bulletin

Issue Date: 12 March 1984
DLR Manual Sect. No. 4

Description:

**FLYING WIRE SHACKLES**

Annual inspections of older aircraft have revealed that the shackles which hold the upper and lower flying wires may need to be replaced as suggested in the owner's manual. There are two of these shackles at the top of the Kingpost (PN #20330) and one at each lower corner of the triber (PN #20311). A newer design shackle was included in aircraft kits during 1983. Check the shackles on your aircraft and determine which type of shackle you have. If the edges are rounded (circular cross section) replace the shackle with a newer squared corner shackle (rectangular cross section). Below you will find drawings of the two types of shackles.

Check the maintenance schedule in your owner's manual to insure that your aircraft has been serviced according to specification. If you have any questions about the condition of your aircraft we suggest that you take it to your dealer for an annual maintenance inspection.

<table>
<thead>
<tr>
<th>MODEL</th>
<th>MINIMUM PILOT WEIGHT</th>
<th>MAXIMUM PILOT WEIGHT</th>
<th>MINIMUM PILOT WEIGHT</th>
<th>MAXIMUM PILOT WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>MX</td>
<td>160 lbs</td>
<td>235 lbs</td>
<td>133 lbs</td>
<td>204 lbs</td>
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<tr>
<td>MXII</td>
<td>196 lbs</td>
<td>350 lbs</td>
<td>136 lbs</td>
<td>303 lbs</td>
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<tr>
<td>MXL</td>
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<td>235 lbs</td>
<td>137 lbs</td>
<td>235 lbs</td>
</tr>
<tr>
<td>MXL AILERON</td>
<td>178 lbs</td>
<td>235 lbs</td>
<td>145 lbs</td>
<td>235 lbs</td>
</tr>
<tr>
<td>MX SUPER</td>
<td>154 lbs</td>
<td>210 lbs</td>
<td>110 lbs</td>
<td>210 lbs</td>
</tr>
</tbody>
</table>
**Service & Maintenance Bulletin**

**MXII-0802-A**

**Description:**

**MXII TRIBAR NOSEWI RE ATTACH FITTING**

All 1984 MXII two-place Ultralights incorporate a new Tribar Nosewire configuration which should extend the service life of the nosewires. The new Tribar Nosewire configuration is on all MXII's with a serial number greater than 1692. We recommend that all MXII owners with an airframe serial number less than 1692 install the new Nose Wire Retrofit Kit (PN 20559).

To make the MXII Tribar Nosewire upgrade you will need to order the Nose Wire Retrofit Kit (PN 20559). The kit includes new nosewires, a 5/16" nosewire bolt, 5/16" hardware and a new attach fitting. In order to make the change you will need the entire kit.

**RETAIL PRICE: £ 13.00**

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**AIRWORTHINESS DIRECTIVE**

**DATE OF ISSUE:** 10-8-84

**MODELS:** MX, MX-II, MXL, MXL-II, MX SUPER

**DESCRIPTION:** 75° TANGS

**AD #:** M-ALL-8402-AD

**PROBLEM:** The 75° tangs used on the above models may be susceptible to cracking at the bend in the tang.

**CORRECTIVE ACTION:** The 75° tangs used on the above described models must be removed and dye-penetrant inspected prior to the next flight. The dye-penetrant used must be MIL-L-4866 MIL SPEC. This inspection kit can be purchased at most welding shops and auto parts stores. If any flaws are found during inspection, the tang must be discarded and replaced. Identification of the tangs is as follows:

<table>
<thead>
<tr>
<th>MODELS</th>
<th>PART #</th>
<th>QTY</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>MX</td>
<td>20355</td>
<td>2</td>
<td>Forward Root Tube &amp; Upper &amp; Lower Nose Wires</td>
</tr>
<tr>
<td>MX-II</td>
<td>20356</td>
<td>1</td>
<td>Forward Root Tube &amp; King Post Wire</td>
</tr>
<tr>
<td>MXL, MXL-II &amp; MX SUPER</td>
<td>20355</td>
<td>2</td>
<td>Aft Root Tube &amp; Root Tube Wire</td>
</tr>
<tr>
<td></td>
<td>20356</td>
<td>1</td>
<td>Forward Root Tube &amp; King Post Nose Wire</td>
</tr>
</tbody>
</table>

Your MX or MX-II may not be equipped with the 3-Hole 75° tang and separate lower nose wires. If not, and replacement of the lower tang is necessary, replace with the 3-Hole 75° tang (PN 20582). Refer to the illustration on Page 2.

The 75° tang (Part #20355) is drilled to accept a 1/4" bolt on the short side of the tang. The 75° tang (Part #20356) is drilled to accept a 5/16" bolt on the short side of the tang. All Dealers should contact the factory and order the amount of new tangs necessary to service dealership and customer aircraft. Customers should contact the factory to order replacement tangs immediately and order the new tangs. If you, the customer, do not know the location of the ZIPPER Dealer in your area, contact the ZIPPER factory.

Upon replacement with new factory tangs, or satisfactory dye-penetrant inspection of all 75° tangs identified herein, this Airworthiness Directive is cancelled.

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**AIRWORTHINESS DIRECTIVE**
Service & Maintenance Bulletin

Issue Date: 10 November 1983
DLR. Manual Sect. No.: 4

Description:
KING POST CHANNELS, ROOT TUBE TRAILING EDGES

We have had reports of King Post channels in the field becoming cracked and split at the bend. The MXII's used for training seem to have the highest incidence of these failures, no doubt due to the hard landings which accompany flight training operations. In all of the failures reported to date the King Post remained in place held by the sail and the fuel tank. In two of the reported cases the failure went unnoticed for several flights because the King Post channel was not checked during preflight. It is critical for your flying safety that you learn the preflight procedure outlined in your owner's manual and perform this inspection thoroughly before each flight.

Before each flight and after any hard landing be sure and check the King Post channel for cracks. You should also check the channel at the end of each day flying. Look at the base of the channel where the bend occurs for any sign of cracking. We have now upgraded the strength requirements for our King Post channels to increase the durability of this important structural component. As a precaution we recommend that all owners who have purchased their aircraft before October 1983, replace the King Post channel.

We have also had cracks appear at the trailing edge of the root tube where the channel bolt holes are drilled. Again this problem is most severe on MXII trainers. If your aircraft has more than 200 hours flying time or is more than one year old we recommend that you contact your dealer about a Root Tube rebuild, during which a 5/16 inch fender washer will be placed under the head of the trailing edge bolts inside the Root Tube.

VOL 4
Issue Date: 26 November 1984
DLR. Manual Sect. No.: MX, MXL, MXB 8403
Total No. of Pages:

Description:
TELEFLEX GUARD KIT

It is recommended that all Quicksilver MX, MXL & MX-II's be upgraded with the addition of a Teleflex Guard Kit. The guard not only extends the service life of the teleflex by helping to prevent dirt, mud, etc., from being thrown on the protruding portion of it by the nose wheel. It also helps to prevent ground handling abuse. The Teleflex Guard Kit's P/N is 96231.
Service & Maintenance Bulletin

VOL. 4

Issue Date: 18 February 1983
DLR, Manual Sect. No.: 4
Total No. of Pages: 1 of 1

MX-83-04-A

Description: Seat Mount Assembly - MX Part Number 70390

Field experience with MX's purchased prior to March 30, 1982 indicates that the seat mount assemblies need to be replaced after 30 to 50 hours of use. Eipper strongly recommends that anyone who purchased an MX prior to March 30, 1982 replace the seat mount with a new part. In order to encourage this replacement, Eipper is offering the improved chrome molly steel seat mounts at our production cost of $35.00 to any original owner who purchased an MX before March 30, 1982.

All current MX owners should inspect their seat mounts every 50 hours and after any hard landing. If there are any signs of bending or stress lines around the holes the seat mount is ready for replacement. Naturally, lighter pilots who make smooth landings will get a longer service life out of their aircraft.

Service & Maintenance Bulletin

VOL. 4

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DLR, Manual Sect. No.: 4
Total No. of Pages: 1 of 1

GT 220-8407

Description:

GT CHOKE CABLE

The Choke Cable, P/N 45813 that was sent out as original equipment is being replaced with a new Choke Cable, P/N 45814. The new cable is designed to operate with less friction and has a twist lock.

Before the new Choke Cable can be installed, the throttle mount plate, P/N 45475 will have to be modified as follows: After removing the original cable, remove material from the throttle mount as indicated by the shaded area in the picture below. Install new cable, routed as before and have a Nice Day.

REPLACEMENT PARTS

<table>
<thead>
<tr>
<th>QTY.</th>
<th>P/N</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>45814</td>
<td>Choke Cable</td>
</tr>
<tr>
<td>6</td>
<td>30485</td>
<td>4&quot; Tie Wraps</td>
</tr>
<tr>
<td>2</td>
<td>30480</td>
<td>7&quot; Tie Wraps</td>
</tr>
<tr>
<td>1</td>
<td>30490</td>
<td>15&quot; Tie Wraps</td>
</tr>
</tbody>
</table>

NOTE: CHOOSE MATERIAL FROM SHADED AREA

Eipper Aircraft Inc.
1050 Linda Vista Drive, San Marcos, CA 92078, (619) 744-1514, Tele: 499-0565

Zipper Aircraft Inc.
26531 Ynez Road, Temecula, CA 92390, (714) 676-3228, Tele: 499-0565
GT FUEL BULBS

GTs with Serial #1001 thru 1550 are equipped with fuel bulb (P/N 30340) and may be susceptible to deterioration under field conditions. The fuel bulbs must be thoroughly inspected for cracks or leaks prior to each flight. If any cracks or leaks are found, do not attempt flight and do not run the engine. (The fuel bulb is located above the fuel tank, on the fuel line). Refer to GT Assembly Instructions, DOC #425-2, Page 9-13.

A new primer bulb, P/N 30340, should be ordered and installed as soon as possible. Upon replacement of the fuel bulb, this Service Bulletin is cancelled.

GT TAIL SUPPORT STRUT ASSEMBLY

To help prevent damage to the GT tail support struts caused by improper ground handling, they have been revised with the addition of an outer sleeve. If your GT has the original struts without the outer sleeves, it is recommended that you replace them with the new struts. The P/N for the new struts is 45020B and are available now.

CARABINERS

If you have a carabiner in your ultralight recovery system that has a load bearing capacity of less than 11,000 lbs., replace it before your next flight with one that is rated at or above 11,000 lbs.
**ROTAX ENGINES**

**Ignition Misfire**

At high revolutions, engine may misfire.

(Defect Report No. 008)

**Propeller Inertia**

Propeller with excessive inertia may cause shock-absorber to be inadequate.

(See attached note and article on measurement of inertia).

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FILE THIS IN YOUR INSPECTOR'S HANDBOOK

**ROTAX ENGINE GEARBOXES AND PROPELLORS**

Nigel Beale, of Cyclone Hovercraft Ltd, has sent in the following notes on Rotax gearboxes and relevant propellers, summarised from a recent Service Sheet (4-U 65/E, dated September 1985) issued by the manufacturers:

1. Early versions of the larger engines (that is, the 503, the 462 and the 532), may require that their shock-absorber springs be uprated if a propeller of high inertia is fitted.

2. The absolute maximum propeller inertia is 3000 kg.cm²

3. A general check of the gearbox and of the spring pre-load of the shock-absorber on all Rotax engines fitted with them, (R 277 through to R 532) should be carried out at intervals of 100 hours or less.

Any owner or inspector seeking further details, is advised to contact Cyclone Hovercraft Ltd, "Burnside", Deppers Bridge, Leamington Spa, CV33 0SU.

Where an inspector encounters any Rotax engine, he/she should check the Airframe and Engine log-book most carefully, to see whether the 100-hour maximum interval has been exceeded. If it has, then the manufacturer's recommended check on the dog gear, shims, springs, etc., may need to be carried out.

On no account should anyone attempt to carry out maintenance or check-work on these gearbox reductions without

(a) having the engineering competence to carry out a satisfactory job on this most crucial of assemblies.

(b) having the manufacturer's instruction-sheet available for guidance. The information given is well detailed and unambiguous.

It also details the range of shims etc., which are available from the manufacturer for the necessarily precise adjustment of the spring-force on the shock-absorber.

Peter Lovegrove
Chief Inspector to the BMAA

12 October 1985
Making rough estimates of the required values.

The value of \( \frac{Rg}{R} \) normally lies between 0.40 and 0.50 for practical propellers. A narrow-tipped propeller with a hefty chord at about half-radius, will have a ratio of about 0.4, whilst one with maximum chord at the tips can approach 0.5. Most propellers are probably not far from 0.45.

If you have an engine/reduction system for which there is an inertia limit for the propellers which may be fitted, weigh the propeller which you would like to use. Assume that \( \frac{Rg}{R} = 0.5 \).

Estimate the inertia thus:

\[
I = 0.25 \, m \, R^2 \quad (\text{lb} \cdot \text{in}^2)
\]

if \( m \) is in lb and \( R \) is in inches.

If you need the inertia in kg cm\(^2\), again multiply this figure by 2.93.

If the calculated inertia exceeds the specified limit by less than 25%, carry out the Bifilar Pendulum test and re-assess.

* My thanks to Tony Evans for the Bifilar Pendulum equation.
PROPELLER INERTIA

Dave Campbell discusses the subject of propeller inertia, currently of interest to owners of Rotax engines, after a recent note from the manufacturers.

Some generalities on the topic.

When a propeller is driven by a typical engine with its cyclically fluctuating driving torque, the rotational inertia of the propeller affects the peak stresses suffered by the components of the drive system. This can be critical for geared reduction drives, in which load reversal will occur if the propeller has more than a certain amount of inertia; such load reversal will lead to early fatigue failure of the gear teeth. The peak stress in belt-driven propeller shafts is similarly increased if a high-inertia propeller is fitted.

A simple method is described here for measuring the inertia of a propeller. Guidelines are also given for making a rough estimation of the inertia of a given propeller, by reference only to its weight and diameter.

Measuring the inertia.

Hang the propeller from two strings of identical length as shown in Figure 1. If you are interested, the name for this arrangement is a Bifilar Pendulum, (a two-ribbon pendulum).

The two strings must be reasonably fine and fixed around the propeller blades at exactly the same distances from the hub centre. They must also be attached to the supporting beam, or what-have-you, so that their top ends are exactly the same distance apart as their lower ends.

The propeller is steadied so that it hangs reasonably still, and then rotated about its vertical axis by about 10 degrees and then released. The period of the swing through one complete cycle is then determined by counting the number of complete cycles which occur in, say, a minute; divide sixty seconds by the number of swings and there you have the period of a single swing. One swing should be counted from when the propeller stops momentarily, to when it next stops in approximately the same position.

The calculations.

From the Bifilar Pendulum swing-period, we calculate not the inertia of the propeller, but its Radius of Gyration. In the simplest of terms, the Radius of Gyration is the radius of a notional ‘hoop’ of the same total mass as the propeller and having the same rotational inertia.

It tells you where the mass of a propeller lies, from the point of view of rotational inertia. It is also a useful concept because, for most propellers, the Radius of Gyration lies at around 45% of the tip radius.

This gives us a check on our Pendulum measurements and provides a means of making rough estimates of the inertia of a propeller from its weight alone.

The basic formula we use is:*  
\[ R_g = \frac{t \cdot d}{4 \pi g} \]  
where  
\[ R_g \] = the Radius of Gyration  
\[ t \] = the Pendulum swing period, in seconds  
\[ g \] = gravitational acceleration

If we use the set-up shown in Figure 1, with measurements in inches, this formula becomes:  
\[ R_g = 1.56 \frac{t \cdot d}{\sqrt{1}} \]  
(inches)

To calculate the inertia, weigh the propeller to determine its mass m. The Polar moment of inertia is then given by:  
\[ I = mR_g^2 \]

If we measure m in pounds and \( R_g \) is in inches,  
\[ I \] will be in lb.in\(^2\)  
(Multiply this figure by 2.93 to get the equivalent value in kg.cm\(^2\)).

Here is worked example to show how easy it all is:

For the test on a Newton propeller for a Dragon microlight, we had:  
\[ I = 20.6 \text{ inches} \]
\[ d = 14 \text{ inches} \]
\[ R = 36.1 \text{ inches} \]
\[ t = 3.07 \text{ seconds (measured with the propeller suspended as a Bifilar Pendulum).} \]

Hence,  
\[ R_g = 14.9 \text{ inches and } R_g = 0.409 \]
\[ m = 8.0 \text{ lb and so } I = 1740 \text{ lb.in}^2 (5110 \text{ kg.cm}^2) \]
SCORPION

THESE MACHINES ARE ALL MANDATORYLY GROUNDED BY
THE CAA Owing TO THE OCCURRENCE OF SEVERAL
IN-FLIGHT STRUCTURAL FAILURES, MOST OF WHICH
PRODUCED FATALITIES.

SHARP REDUCTION DRIVES
(Now taken over by Hornet Microlights).

Drive (engine) pulley flange
Check pulley alignment and flange security.

Reduction shaft
Breakage.
SKYHOOK SABRE

Tension-cable adjuster
Can be adjusted too far on old wings.
(Defect Report No. 011)

SOLAR WINGS (Trike wings only)

STORM

Cross-booms
The cross-booms on the large Storm glider MUST carry over-sleeves on each half. (This is a mandatory factory-modification, if the wing is to be used for triking). Check that the sleeves are fitted and that the booms are not bent forward.

Hang-channel
Check carefully that the bolts which join the hang channel to the keel are not bent.
PUMA SPLINT

Seat webbing
The top seat-support webbing fouls on the top seat-frame nuts. Check for undue wear.

Batten-retaining bungees
The batten-retaining shock cords, fitted to the trailing edge of the sail, have been tied by doubling the elastic and applying a single turn. They should all be undone and tied in reef knots.

Keel hang-block
Check that no undue wear is occurring between the thin steel rings - fitted wither side of the block - and the keel. Some machines have only one (front) ring fitted.

Ignition switch position
Unlikely as it may seem, the ignition switch, fitted immediately beneath the pilot's right thigh, can be accidentally turned off by the passenger's foot. Recommend to the owner that he/she relocates the switch.

Electrical wiring
Check crimps for security and presence of broken strands.

Fuel tank
Check that the fuel pick-up pipe is not hard against the tank base and trying to pierce it.

Full 440 cc light-weight engine
This engine has a history of crankshaft failures, many occurring within the first 25 hours of running. It would be prudent to warn the owner.

Monopole mast
May crack at top engine-mounting bolt-holes, if machine abused by hard landings, etc. (Defect Report No. 013).
ULTRASPORTS

Lower engine mount
The early engine mount consisted of a rubber bush housed in a small casing through which passed a special bolt. The rubber disintegrates with prolonged exposure to petrol. Check carefully for safe fixing.

Drag struts
Check the fixing holes at the drag-strut ends for elongation and break-out.

Keel
Check the keel immediately forward of the seat frame for distortion.

Rear Axle
Stretch in bracing cables below axle.
Elongation of bolt-holes at outboard ends of axle.
Elongation of bolt-holes in keel-plates and inboard ends of axle.

WEEDHOPPER

Strut tangs
Tangs at upper end of struts must be 7/8" x 1/8" STAINLESS STEEL.

Lower ends of struts
Struts must terminate in some form of channel, not on single bolt through axle.

Nose-leg bolts
Two bolts in lower part of leg must be 5/16" diameter (not 1/4").

Rear fuselage brace
Sub-fin lower tube must be braced to two rear fuselage braces with a cross-tube.

Fuselage cluster
Where four pairs of fuselage braces converge at axle, plates must hold them all in double shear.